Saskatchewan
Energy and Mines

Saskatchewan
Geological Survey

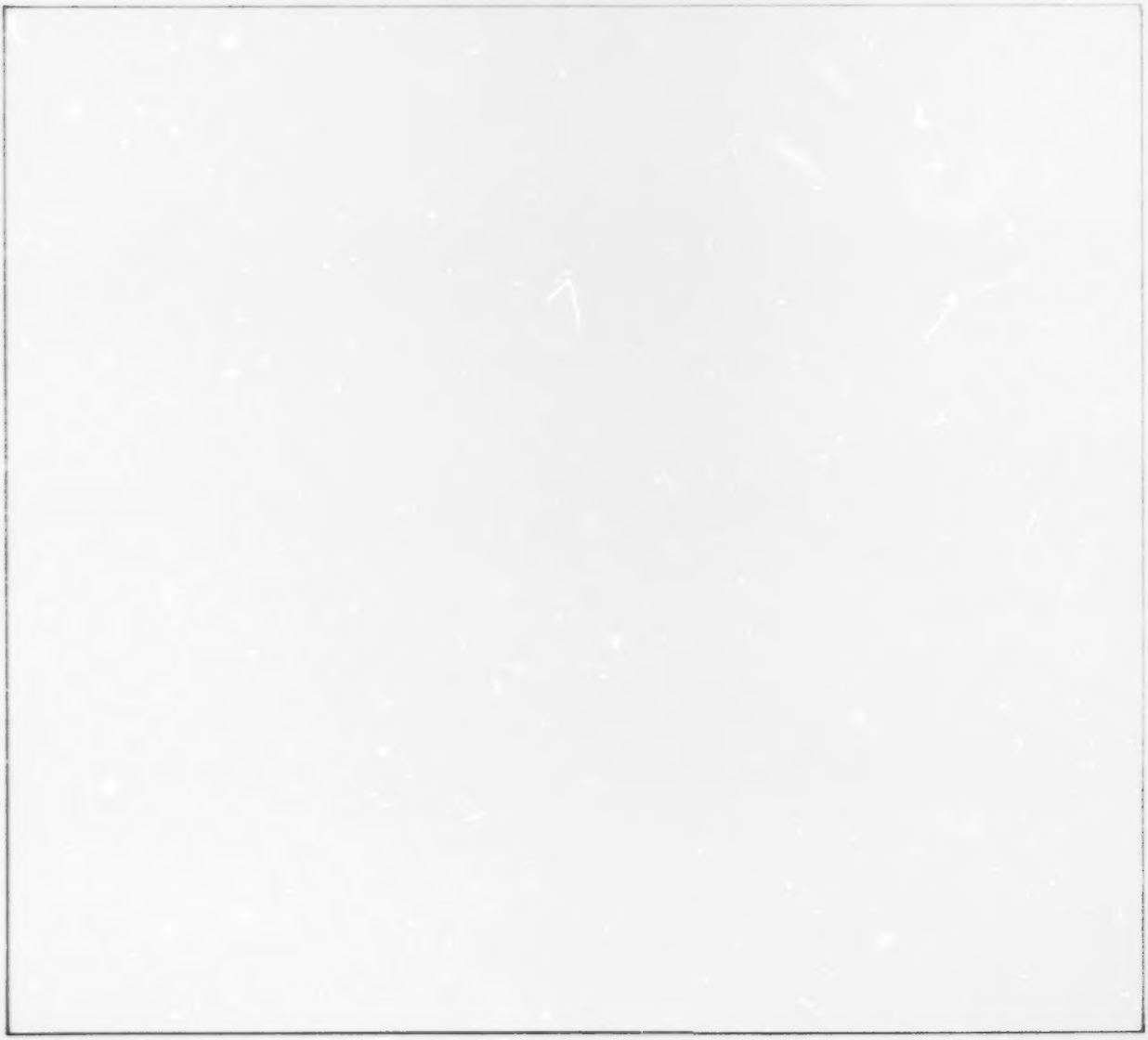
Report 239

Metallogenic Map Series:

Reindeer Lake North, NTS Area 64E

First Edition, 1984

compiled by D.G. Macdougall



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Printed under the authority of the
Minister of Energy and Mines

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Reviewed and edited by
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Mineral Development Section

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Table of Mineral Occurrences

The abbreviations of mineral names used in this table are those standardized by the Geological Survey of Canada, with additions where necessary:

asp — arsenopyrite
bo — bornite
cct — chalcocite
cp — chalcopyrite
fl — fluorite
gn — galena
gf — graphite
hem — hematite
lm — limonite
mag — magnetite
ma — marcasite
mal — malachite
mo — molybdenite
py — pyrite
po — pyrrhotite
ra — radioactive minerals
sp — sphalerite
ur — uraninite
REE — rare earth elements

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
535	Ni (Fe, Cu, Ag)	Kinoosao Nickel Prospect	01	sulphides, not identified, green secondary minerals not identified	biotite-quartz-feldspar gneiss, hornblende gneiss, pyroxene-garnet rock	25, 98
536	Cu (Fe, Ni, Zn, Au, Ag)	Wepusko Bay	02	py, po, cp, sp	quartz-biotite gneiss, quartz-feldspar-biotite gneiss, quartzite, pegmatite	91, 98
537a	C (Fe)	Spalding Lake	03	gf, py	shear zone	61
537b	Fe	"	"	mag	augen gneiss	61
537c	Cu	"	"	cp	metagabbro	61
538a	Cu (Ni, Fe)	Korvin Lake	04	cp, po, py	gabbro	17, 18, 19, 24, 57, 70 (p17, map 199A)
538b	Fe	"	"	mag	metadiorite	
538c	Cu	"	"	cp	granitic rocks, quartz stringers and veins	
539	Fe	Bothwell Lake	04	mag	granitic biotite gneiss	61, 70 (p17, map 199A)
540a	Fe	Warner Lake	04	py	granite	3, 70 (p17, map 199A)
540b	Fe	"	"	py	gabbro	3, 70 (p17, map 199A)
541	As (Pb, Zn)	Brakewell (George) Lake	05	asp, gn, sp	shales	8, 9, 10, 29, 30, 31, 32, 33, 66, 81, 84, 85, 86, 89 (p22-23, map 135A)
542	Be	Courtenay Lake	05	beryl, garnet	pegmatite dyke in arkose	89 (p22-23, map 135B)
543	Be	Pyett Lake	05	beryl, garnet	pegmatite dyke in diorite	88, 89 (p22-23, map 135A)
544	Cu	Pyett Lake	05	cp	hornblende gneiss	88, 89 (p22-23, map 135A)
545	Cu (Ni)	Combe Lake	05	cp, py, po	dioritic gabbro	87 (p18), 88, 89 (p22-23, map 135A)
546	Cu	Combe Lake	05	cp	dioritic gabbro	89 (p22-23, map 135A)
547	Cu	Courtenay Lake	05	cp	metabasaltic andesite	88, 89 (p22-23, maps 135A & B)
548	Pb (Zn, Ag, Fe, As)	Brakewell (George) Lake	05	gn, sp, py, po, asp	quartz veins in argillite and quartzite; disseminated in quartzite and argillite	66, 80, 84, 85, 86
549	Fe (Pb, Zn)	Courtenay Lake	05	py, gn, sp	not stated	8, 9, 10, 29, 30, 31, 32, 33, 66, 81, 84, 85, 86, 89 (p22-23, map 135A)
550	Fe (As)	Souter Lake	05	py, asp	argillite	8, 9, 10, 29, 30, 31, 32, 33, 66, 81, 84, 85, 86, 89 (p22-23, map 135A)

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
551	Fe	Brakewell (George) Lake area	05	py. po	argillite	8. 9. 10. 29. 30. 31. 32. 33. 66. 81. 84. 85. 86. 89 (p22-23. map 135A)
553	U	Charles Lake	05	none identified	granitic gneiss	62
554	Zn (Pb)	Brakewell (George) Lake area	05	py. sp. gn	biotitic quartzite (3% sulphides)	8. 9. 10. 29. 30. 31. 32. 33. 66. 81. 84. 85. 86. 89 (p22-23. map 135A)
555	Zn (Pb)	Brakewell (George) Lake area	05	sp. gn	not stated	8. 9. 10. 29. 30. 31. 32. 33. 66. 81. 84. 85. 86. 89 (p22-23. map 135A)
556	Cu	Spalding Lake	06	cp	calcite-quartz vein, at contact of granite/ultrabasic sill	16. 61
557	Cu (Ni. Fe)	Morwick Lake	06	cp. po	gabbro	76
558a	Cu (Fe. Ni)	Morwick Lake	06	cp. po	gabbro	76
558b	Mo	"	"	mo	gabbro	76
559	Ni (As. Cu)	Campbell-Hornfels Lakes	06	niccolite. cp	gabbro	3. 4. 6. 63. 64
560	Fe	Morwick Lake	06	py	gabbro and diabase dykes in quartzofeldspathic metasediments	62
561	U (REE)	Morwick Lake	06	ur. rare earths	biotite segregations in pegmatite	97
562	Zn (Fe)	Campbell-Hornfels Lakes	06	sp. py	argillite	3. 4. 6. 63. 64. 68. 70
563	Zn (Fe)	Campbell-Hornfels Lakes	06	sp. py	argillite	3. 4. 6. 63. 64. 68. 70
564	Zn (Fe)	Campbell-Hornfels Lakes	06	sp. py. po	argillite	3. 4. 6. 63. 64. 68. 70
565	Zn (Cu. Fe)	Campbell-Hornfels Lakes	06	sp. cp. py	argillite	3. 4. 6. 63. 64. 68. 70
566	Zn (Fe)	Campbell-Hornfels Lakes	06	sp. py. po	argillite	3. 4. 6. 63. 64. 68. 70
567	Zn (Fe)	Campbell-Hornfels Lakes	06	sp. py. po	argillite	3. 4. 6. 63. 64. 68. 70
568	Zn (Cu. Pb. Fe. Ag. C)	Paskwachi Bay. Brown (Bay) Claim Group	08	py. po. sp. cp. gf. gn. garnet	amphibolite lenses. gneisses. near pegmatite veinlets	1 (p217). 2 (p118-119). 60. 93. 94 (p15). 95 (p68-70. map 233A). 98
569	Cu (Zn. Ni. Au. Ag. C. Fe)	Wiley Bay. Reindeer Lake	10	cp. py. po	shear zone breccia in hornblende-biotite gneiss. biotite-feldspar gneiss. hornblende-feldspar gneiss	65. 98
570a	Cu (Fe)	Swan Lake	10	py. po. cp	ultrabasic plug	20. 97. 98
570b	Fe	"	"	py. po. mag	metavolcanic gneiss. pegmatite	20. 97. 98
571	Cu (Pb)	Mullin Lake	11	cp. gn	silicified contacts of gabbro dyke. slip plane	21

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
572a	Cu (Fe)	Swan Lake	11	py, po, cp	ultrabasic plug	21, 97, 98
572b	Fe	"	"	py, po, mag	metavolcanics	21, 97, 98
572c	Fe	"	"	mag	pegmatite bodies	21, 97, 98
573	Cu (Fe)	Mullin-Fordham-Morwick Lakes	11	cp, py, native Cu	meta-argillite and interlayered meta-volcanic flows	62
574	Cu	Fordham Lake	11	cp	quartz-hornblende rock (possibly a calc-silicate?)	77, 81
575	Cu (Fe)	Fordham Lake	11	cp, py	quartz vein, with hornblende inclusions in meta-sediments including feldspathic biotitic quartzite, arkose, arkosic quartzite and greywacke	77, 81
576	Fe (Cu, C)	Cairns Lake	11	mag, py, po, gf, cp, native Cu	garnetiferous hornblende-rich skarn	77, 81
577	Mo	Mullin-Fordham-Morwick Lakes	11	mo	pegmatite	62
578a	Pb	Cairns Lake	11	gn	quartz vein in quartzite	77, 81
578b	Pb (Fe)	"	"	gn, py	biotitic quartzite	77, 81
579	Pb (Fe)	Beeching Lake	11	po, gn	quartz vein in cherty quartzite	77, 81
580	Pb (Fe)	Cairns Lake	11	py, gn	glassy quartzite (quartz vein?)	77, 81
582	Fe (Cu)	Swan River	11	py, po, cp	pyroxenite and gabbro	62
583a	Fe	Middle Lake	11	py	grey quartzite	77, 81
583b	Fe (Zn, C)	"	"	py, sp, gf	hornblende-rich diorite	77, 81
584	Fe (Zn, Cu)	Middle Lake	11	py, po, cp, sp	quartz-feldspar-biotite gneiss, biotitic quartzite, grey quartzite, cherty quartzite	77, 81
585	Fe	Tighe Lake	11	py, po	quartz-feldspar-biotite gneiss, biotite-feldspar-quartz gneiss	77, 81
586	Fe	Middle Lake	11	py, po	quartz-feldspar-biotite gneiss,	77, 81
587	Fe	Beeching Lake	11	py	quartzite	29, 34
588	U	Mullin-Fordham-Morwick Lakes	11	not identified	pegmatite veins in felsic metasediments	62
589	U	Mullin-Fordham-Morwick Lakes	11	not identified	granite, granite gneiss	62
590	U	Mullin-Fordham-Morwick Lakes	11	not identified	pegmatite veins in felsic metasediments (quartz-feldspar gneiss, hornblende-biotite gneiss)	62
591	Zn (Fe)	Tighe Lake	11	py, ma	white quartzite + massive sulphides (60%)	77, 81
592	Zn (Fe)	Beeching Lake	11	py, sp	grey quartzite	77, 81
593	Zn (Pb, Fe, Ag)	Beeching Lake	11	py, sp, po, gn	grey quartzite, glassy quartzite (quartz vein?)	77, 81

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
594	Ag (Pb, As, Fe)	Spence Lake	12	gn, py, asp, po	grey quartzite, biotitic grey quartzite, argillaceous quartzite, quartz vein	12, 80
595	Cu (Ag)	Morell Lake area	12	cct	arkose	38
596	Pb (Ag, Fe)	Morell Lake area	12	gn, py, po	seam in green quartzite	38
597	Pb (Ag, Fe)	Morell Lake area	12	gn, py	greenish quartzite	38
598	Pb (Ag)	Zentner Lake	12	not identified	greenish quartzite	38
599	Zn	Morell Lake	12	sp	quartzite	38
600	Zn	Morell Lake	12	sp	green, white, buff quartzite	38
601	Zn (Fe, Ag)	Morell Lake	12	po	buff quartzite	38
602	Zn (Pb, Cu)	Morell Lake	12	gn, sp, cp, bo, cct	calc-silicate rock and white quartzite	38
603	Zn (Fe)	Morell-Zentner Lakes	12	py	buff quartzite	38
604	Zn (Pb, Ag, C)	Morell Lake	12	py, po, sp, gf	white mottled quartzite + 50% massive sulphide, grey-buff quartzite (less than 10% sulphide)	11, 38
605	C	Woodward River	15	gf	disseminated in biotite schist and in shear zone	62
606	Fe	Woodward River	15	py	gabbro	62
607	U	Woodward River	15	not identified	pegmatoid	62
608	Mo	Zangeza Bay	16	mo	quartz bleb in amphibolite	22, 23, 90, 92, 98
609	Mo	Krauchi Peninsula	16	mo	aplite	22, 23, 90, 92, 98
610	Mo	Crimes-Brockbank Lakes	16	mo	pegmatite stringer in biotite granodiorite	22, 23, 90, 92, 98
611a	Mo	Zengle Lake	16	mo	pegmatite vein	22, 23, 90, 92, 98
611b	Fe	"	"	po, py	gabbroic rocks	22, 23, 90, 92, 98
663	Zn (Pb, Ag, Fe)	Brakewell (George) Lake	05	sp, py, gn	grey quartzite + 2-30% sulphides	8, 9, 10, 11, 13, 29, 30, 31, 32, 33, 59, 69, 71, 84, 85, 86, 89 (p22-23, map 135A)
1695	Cu (Ag)	Geikie River	12	cp	white quartzite	41, 42, 43, 48, 51, 52, 53, 78, 79
1696	Cu (Fe)	Geikie River	12	py, bo, cp	quartzite	41, 42, 43, 48, 51, 52, 53, 78, 79
1697	Cu (C)	Geikie River	12	cp, gf	quartzite	41, 42, 43, 48, 51, 52, 53, 78, 79
1698	Mo (Cu)	Geikie River	12	cp, mo	white quartzite	41, 42, 43, 48, 51, 52, 53, 78, 79
1699	Mo (Ag, As, Co)	Geikie River	12	asp, mo	quartzite + greater than 40% sulphides	41, 42, 43, 48, 51, 52, 53, 78, 79
1700	Fe	Spence Lake	12	py, po	black slate, interbanded with white quartzite	29, 34, 36, 37, 39

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
1701	Fe	Spence Lake	12	py	quartzite	29, 34, 36, 37, 39
1702	U	Geikie River	12	thucolite (not positively identified)	metasediments, migmatite, pegmatite	29, 34, 36, 37, 39, 42, 43, 51, 52, 53
1703	U (Th)	Geikie River	12	not identified	pink pegmatite	44
1704	Zn (Cu, Pb, Mo, Fe)	Joannie Showing, Compulsion River	12	py, po, cp, sp, mo	disseminations and fracture fillings in quartzite, pegmatite, arkose, biotite gneiss	45, 47
1705	Cu (Fe)	Nekweaga Bay	13	po, cp	metaquartzite in metasedimentary sequence intruded by granite	44, 49, 50, 51, 52, 53
1706	U (Th)	Linn Island	13	unidentified secondary uranium and opaque primary uranium minerals	red granite, granite gneiss	26, 27
1707	U (Th)	Nekweaga Bay	13	not identified	in fractures in biotite gneiss cut by pegmatite veins	44, 49, 50, 51, 52, 53
1708	U (Th)	Nekweaga Bay	13	not identified	pegmatite	44, 49, 50, 51, 52, 53
1709	Zn (Fe)	Carefoot Lakes	13	sp, po	buff-white quartzite	38
1710	U	Middle Lake	14	secondary uranium minerals (gummite) and disseminated uraninite	quartzite, migmatized metasediments, granite, aplite veins in granite, biotite pod in quartz vein, fracture in pegmatite sill in hornblende gneiss	35, 40, 46, 73, 77
1711	U	Jewison Lake	15	unidentified secondary uranium minerals	pod of siliceous biotite gneiss in granite	35, 40, 46, 73, 77
1798	Zn (Pb)	Vollman Lake	05	sp, gn	quartzite boulder	67
1799	Zn (Pb)	Vollman Lake	05	sp, gn	quartzite boulder	67
1800	Zn (Pb)	Vollman Lake	05	sp, gn, py	quartzite boulders	67
1801	Fe	Wakefield Lake	05	py	quartzite boulders	67
1802	Fe	Wakefield Lake	05	py	quartzite boulder	67
1803	Fe	Wakefield Lake	05	py	quartzite boulders	67
1804	Fe	Wakefield Lake	05	py	quartzite boulder	67
1805	Zn (Pb)	Wakefield Lake	05	sp, gn	quartzite boulder	67
1806	Fe	Courtenay Lake	05	py	quartzite boulder	67
1807	Fe	Courtenay Lake	05	py	quartzite boulder	67
1808	Fe	Wakefield Lake	05	py	quartzite boulder	67
1809	Fe	Wakefield Lake	05	py	quartzite boulder	67

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
1810	Zn (Pb)	Wakefield Lake	05	sp, gn	quartzite boulders	67
1811	Zn (Pb)	Spence Lake	05	sp, gn	quartzite boulders	67
1812	Zn (Pb)	Brakewell (George) Lake	12	sp, gn	quartzite boulders	67
1813	Zn (Pb)	Brakewell (George) Lake	12	sp, gn	quartzite boulder	67
1814	Zn (Pb)	Spence Lake	12	sp, gn	quartzite boulders	67
1815	Fe	Spence Lake	12	py	quartzite boulder	67
1816	Fe	Brakewell (George) Lake	12	py	quartzite boulder	67
1817	Zn (Pb, As, Ag)	Brakewell (George) Lake	12	sp, gn, asp, py, po	quartz breccia boulder	67
1818	Fe	Brakewell (George) Lake	12	py	quartzite boulder	67
1819	Zn (Cu, Pb)	Brakewell (George) Lake	12	sp, gn, cp, py	quartzite boulders	67
1820	Zn (Pb)	Spence Lake	12	sp, gn	quartzite boulder	67
1821	Zn (Pb)	Spence Lake	12	sp, gn	quartzite boulders	67
1822	Fe	Compulsion River	11	py, po	quartzite, meta-arkose, graphitic pelitic to semi-pelitic biotite gneisses	71 (p27, map)
1823	U	Morell Lake	12	secondary uranium minerals not idenitifed (1500 cps)	biotite-rich zone in red granite	28
1824	Pb (Zn)	Simon Lake	12	gn, sp	frost-heaved impure quartzite, calc-silicate gneiss	5, 71 (p25, map)
1825	Cu (Fe)	Blondeau River	11	cp, py, po	grey quartzite	69, 71 (p25, map)
1826	Cu (Fe)	Nekweaga Bay	13	cp, py	mixed psammites and pelites	71 (p25, map)
1827	Fe	Nekweaga Bay	13	py, po	mixed psammites and pelites with calc-silicate	71 (p25, map)
1828	Cu (Fe, C)	Michael Lake	13	cp, py, po, gf, ma	biotite paragneiss with pink pegmatite	56
1829	Fe	Minor Bay	13	po, py	biotite paragneiss and calc-silicate	55
1830	Pb	Nekweaga Bay	13	none identified (2110 ppm Pb in analysis)	hornblendic granite	74
1831	Cu (Pb, Zn)	Carefoot Lake	14	cp, gn, sp	quartzite	28
1832	U	Middle Lake	14	none identified	biotite gneiss, biotitic granite	14
1833	Fe	MacKenzie Lake	15	po, lm	boulders of hornblende granite	82
1834	Cu (Fe)	Zengle Lake	16	bo, po, py, mal	gabbro	22, 83, 90

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
1835	Fe	Crimes Lake	16	po, py	hornblende-biotite granodiorite with amphibolite remnants	92
1836	Fe	McLean Bay area	16	po, py	biotite trondhjemite and granodiorite with amphibolite remnants	92
1837	Fe	island in McLean Bay	16	po, py	amphibolite, minor hornblendite, pyroxene amphibolite	92
1838	Fe	Smith Point	16	po, py	hornblende-biotite granodiorite with inclusions of leucocratic biotite granodiorite	92
1839	Zn (Pb)	Brakewell (George) Lake	05	sp, gn	quartzite boulders	67
1840a	Fe	Brakewell (George)-Spence Lakes	05	mag	banded iron formation, garnetiferous pelite, oxide and silicate facies	12, 58 (p41-46)
1840b	Fe	Spence-Cairns Lakes	11 12	mag	banded iron formation, garnetiferous pelite, oxide and silicate facies	12, 58 (p41-46)
1841	F	Salaba Lake	12	fl	biotite paragneiss, pegmatite	7 (p14)
1842	Zn (Pb, Cu)	Loranger Bay	14	cp, py (gn, sp not recorded)	paragneiss	74
1843	Cu (Fe)	Labine Lake	04	cp, po, py	gabbro	18
1844	Cu (Fe)	Korvin Lake	04	cp, po, py	gabbro, pyroxenite	18, 19
1845	Cu (Fe)	Korvin Lake	04	cp, po, py	massive sulphide in gabbro, chalcopyrite in shears in gabbro	19
1846	U (Th)	Brandser Island	14	not identified	paragneiss	74
1847	U	mainland east of Brandser Island	14	not identified	diorite	74
1848	U (Fe)	mainland east-southeast of Brandser Island	14	U mineral not identified, mag, il	pegmatitic granite lens in red granite	75
1849a	U	McConnell Lake	13	not identified (analysis only)	pink granite in meta-arkose	74
1849b	Zn (Pb, Cu)	"	"	not identified (analysis only)	meta-arkose	74
1850	U	McConnell Lake	13	not identified (analysis only)	paragneiss	74
1851	U	Jackson Lake	13	not identified (analysis only)	paragneiss and granite	74

SMDI No.	Elements Present	Name of Occurrence/ General Location	NTS 64E-	Minerals Present	Host Rock/ Structures and Remarks	Reference Numbers
1852	Zn (Pb, Cu)	Jackson Lake	13	not identified (analysis only)	paragneiss, quartzite and unaltered pelites	74
1853	U	Wollaston Lake	14	not identified (analysis only)	granite gneiss	74
1854	U (Th?)	Compulsion Bay	14	not identified (5000 cps radiometric anomaly)	gneissic granite	75
1855	Fe	Berston Island	16	po, py	hornblende-biotite granodiorite with inclusions of leucocratic biotite granodiorite	92

Appendix A

Geological Legend

This legend is extracted, with minor rearrangement, from:

Macdonald, R. and Thomas, M.W. (1983): Compilation Bedrock Geology, Reindeer Lake North, NTS Area 64E; Saskatchewan Energy and Mines, Report 232 (1:250 000 scale map with marginal notes).

PALEOHELIKIAN

ATHABASCA GROUP

MFb — **Manitou Falls Formation**: unmetamorphosed fluviatile quartz sandstone with 2 to 20 percent interstitial clay, locally interbedded with clast-supported conglomerates, overlying deeply weathered basement.

sc: conglomerate and sandstone (Reilly Lake exposure; relation to Athabasca Group not certain)

WOLLASTON DOMAIN

LATE APHEBIAN (HUDSONIAN[1])

Wpeg — **Granitic pegmatite**: variable grain size, generally massive; ± biotite ± muscovite ± garnet; contacts with migmatitic supracrustal gneisses commonly gradational.

Wg — **Granite and alaskite**: fine to coarse grained, massive to weakly foliated; ± biotite ± hornblende ± magnetite ± microcline megacrysts; contacts with migmatitic supracrustal gneisses commonly gradational.
Horton Island granite has strongly discordant intrusive contacts with country rocks.

EARLY TO MIDDLE APHEBIAN (in general stratigraphic order)

Wollaston Group

Wcn — **Calc-silicate gneiss, marble and amphibolite**: medium grained to pegmatitic; variable composition and texture; ± diopside ± albite ± hornblende ± biotite ± actinolite/tremolite ± calcite ± scapolite ± grossularite; occurring as conformable bands and lenses in supracrustal sequence.

Wrn — **Meta-arkosic gneiss**: fine to medium grained, massive to foliated to gneissic, locally layered; ± biotite ± hornblende ± diopside ± muscovite ± sillimanite ± garnet ± cordierite ± magnetite ± pyrite; locally interlayered with metaquartzite, pelite and calc-silicate rock; commonly anatectic with more than 50 percent leucogranitic neosome.

Wpsn — **Pelitic to psammopelitic gneiss**: fine to medium grained, foliated to gneissic; ± biotite ± quartz ± feldspar ± graphite ± sillimanite ± muscovite ± cordierite ± garnet ± pyrite/pyrrhotite; interlayered metaquartzite, meta-arkose, calc-silicate rock and marble with psammitic types locally abundant; commonly anatectic with more than 50 percent leucogranitic to tonalitic neosome, especially in north-central part of area.

Ws — **Mixed metasediment**: variable unit both along and across strike, generally fine grained and foliated; interlayered laminated slate, meta-argillite, metaquartzite, metachert, meta-arkose, calc-silicate rock, marble and rare banded iron formation.
possible facies equivalent to unit Wpsn

Wq — **Metaquartzite**: fine grained, massive to foliated, locally layered; ± muscovite ± biotite ± garnet ± feldspar ± hornblende ± sulphide; local conglomerate and interlayered graphitic meta-argillite ± andalusite ± garnet ± sulphide.
equivalent to upper part of Souter Lake group (Scott 1970)

PROBABLY EARLY APHEBIAN (LATE ARCHEAN?)

Wr — **Meta-arkose**: fine to medium grained, massive to foliated, locally layered and cross stratified; ± muscovite ± magnetite ± lithic fragments; local conglomerate with granite, granite gneiss, metavolcanic and metasedimentary clasts; local interbedded pelitic schist ± andalusite ± staurolite ± garnet.
equivalent to Courtenay Lake group and lower part of Souter Lake group (Scott 1970)

Wv — **Amphibolite**: fine grained, massive to poorly foliated, locally pillowed; local intercalated pelitic gneiss.
occurs conformably within unit Wr

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

ARCHEAN, DEFORMED AND METAMORPHOSED WITH APHEBIAN SUPRACRUSTAL ROCKS DURING THE HUDSONIAN OROGENY

Wfn — **Felsic granitoid gneiss**: fine to coarse grained, foliated to gneissic, generally homogenous rocks of syenogranitic to granodioritic composition ± biotite ± amphibole ± sillimanite, with rare hypersthene (of granulite facies metamorphic origin); local inclusions of amphibolite and/or pelitic schist; locally partially anatectic with leucogranite neosome.
dated outside the area by Rb-Sr and U-Pb methods at c.2515 Ma

[1] The term 'Hudsonian' has been used by most authors in Saskatchewan to indicate the tectonometamorphic activity or orogeny which affected Aphebian rocks and older basement during the interval approximately 1900 to 1650 Ma ago. In this legend the term 'Hudsonian s.s.' (sensu stricto) refers to the more specific peak of activity fixed by Rb-Sr isochron determinations on plutonic rocks at c.1750 to 1740 Ma (see Douglas, 1980; Bell and Macdonald, 1982).

References cited in the legend are listed on Map 232A, Compilation Bedrock Geology Series.
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PETER LAKE DOMAIN

APHEBIAN AND ARCHEAN ROCKS, STRONGLY REWORKED PROBABLY LATE IN THE HUDSONIAN

Px — **Mylonite**: fine grained to aphanitic, streaky to finely laminated, interlayered mafic and felsic gneiss

Pgn — **Felsic gneiss**: medium grained, strongly foliated to gneissic, locally submylonitic granitoid rock ± biotite ± hornblende ± flasered microcline megacrysts.
probably largely derived from unit Pg

Pbn — **Mafic gneiss**: fine to medium grained, foliated to gneissic, locally submylonitic, ± hornblende ± plagioclase ± biotite ± quartz ± potassium feldspar, local pods of weakly foliated to massive mafic rock.
probably largely derived from unit Pbg

HUDSONIAN WITH POSSIBLE ARCHEAN ELEMENTS

Pg — **Felsic granitoid**: generally medium to coarse grained, locally megacrystic, multiply intrusive, granodioritic to syenitic to alaskitic and aplitic, local relict igneous textures, generally only weakly foliated except in discrete shear zones, ± biotite ± amphibole, local amphibolite and/or pelite inclusions, intrusive in part into unit Pbg.
magmatic rocks, possibly in part derived by anatexis of supracrustal rocks

Pgl: late granodioritic to alaskitic and aplitic intrusive sheets of the Zangeza Bay area

Pgp — **Megacrystic granitoid** (indistinguishable in places from unit Rgp)

Pgpx: sheared variants (Middle Lake granite)

PROBABLY MAINLY ARCHEAN

Pbg — **Mafic plutonic rocks**: fine to coarse grained, massive to weakly foliated, metatonalite to metadiorite to metagabbro, local relict ophitic to subophitic texture, ± hornblende ± plagioclase ± biotite ± actinolite/tremolite, with local metasedimentary xenoliths, appears to intrude 'Campbell River Group'.
includes amphibolitic rocks of possible metavolcanic origin

Pba: layered metagabbro, minor anorthosite, ultramafic rock and granodiorite (McLean Bay gabbro)

Pbp: megacrystic diorite, massive with potassium feldspar megacrysts (Patterson Island pluton).
intrusive into unit Pbg, age uncertain

Pqf — **Quartzofeldspathic gneiss**: fine to medium grained, equigranular, generally well foliated to gneissic, locally compositionally banded, granitic to granodioritic ± biotite ± hornblende, local biotite-hornblende gneiss lenses.
probably partly of supracrustal origin

'Campbell River Group'

Psl — **Slate, phyllite and biotite schist**: very fine to fine grained, well foliated, locally layered, ± biotite ± muscovite ± pyrite/pyrrhotite ± carbonaceous material, local hornblende-biotite schist, psammite, amphibolite and metagabbro

ROTTENSTONE DOMAIN

APHEBIAN (HUDSONIAN) WITH POSSIBLE ARCHEAN ELEMENTS

Rgp — **Megacrystic granitoid**: medium to coarse grained, massive to foliated, with local igneous flow banding, microcline megacrysts ± biotite ± hornblende quartz monzonite, monzogranite and granodiorite, local pelite, amphibolite and/or metadiorite xenoliths, locally abundant pegmatite aplite and non-megacrystic granitoid toward margins

Rgpx: sheared variants, with strongly foliated groundmass and flasered microcline megacrysts, locally submylonitic (Reilly Lake Shear Zone)

Rbd — **Quartz monzodiorite, diorite and gabbro**: fine to coarse grained, massive to foliated, ± hornblende ± plagioclase ± potassium feldspar ± quartz ± biotite, local paragneiss inclusions, contact zones commonly injected with granitic material.
compositionally similar and possibly in part equivalent to unit Pbg

Rpeg — **Granitic pegmatite**: massive to foliated, ± biotite ± muscovite ± hornblende ± garnet

Rgt — **Tonalite, granodiorite and trondhjemite**: compositionally variable, generally potassium feldspar-poor, fine to coarse grained, locally pegmatitic, massive to foliated, ± biotite ± muscovite ± garnet ± hornblende, local amphibolite and/or pelite inclusions.
considered to have undergone multistage intrusion anatexis and migmatization

Rgtz: metasomatized leucotonalite, pink, massive, porphyroblastic, with introduced potassium felospar and quartz in aureole of Wathaman Batholith

Rmg — **Amphibolite and derived migmatite**: *paleosome* fine to medium grained, foliated, locally layered, ± hornblende ± feldspar ± biotite ± muscovite ± garnet ± quartz, local pelitic to psammitic gneiss and calc-silicate gneiss, *neosome* tonalitic, granodioritic or trondhjemitic (50 to 90 percent of unit), medium to coarse grained to pegmatitic, massive to foliated, ± biotite ± muscovite ± garnet ± hornblende

Rng — **Pelitic to psammitic gneiss and derived migmatite**: *paleosome* fine to medium grained, well foliated to gneissic, locally layered, ± biotite ± quartz ± feldspar ± muscovite ± garnet ± sillimanite ± graphite, *neosome* tonalitic, granodioritic or trondhjemitic (50 to 90 percent of unit), medium to coarse grained to pegmatitic, massive to foliated, ± biotite ± muscovite ± garnet ± hornblende

LA RONGE DOMAIN

PROBABLY 'HUDSONIAN s.s.' (c.1740 Ma)

Lgd — **Granodiorite and quartz monzonite**: medium grained, well foliated to gneissic, biotite ± hornblende, abundant xenoliths of paragneiss and unit Lgm

Lgm — **Quartz monzodiorite**: fine to coarse grained, foliated to gneissic, ± hornblende ± biotite, abundant xenoliths of paragneiss and amphibolite, neosomes of grancdioritic to quartz monzonitic material in migmatitic contact zone

Mineral occurrences are largely confined to the Wollaston and Peter Lake Domains, only two showings being recorded in the Rottenstone Domain and one in the La Ronge Domain.

Four general types of mineralization are distinguished:

1) Sediment-hosted Zn, Pb, Fe, Cu, Mo sulphides and Fe silicates and oxides (iron formation).

2) Cu, Fe, Ni sulphides disseminated in basic and ultrabasic igneous rocks.

3) Molybdenite in late stage granitic differentiates.

4) Uranium mineralization in acid plutonic rocks, or in the felsic mobilizate of migmatized metasediments.

1) Sediment-Hosted Mineralization

Sediment-hosted mineralization is mainly confined to four distinctive northeast-trending zones, of which three are within Wollaston Group metasediments (see figure at bottom right). Different mineralization characterizes each of these zones: Cu-Mo predominates in zone (A), Zn-Pb in zone (B), Zn-Pb and iron formation in zone (C) and Zn-Fe in zone (D).

Zone A: Gable River - Nekweaga Bay

Zone A correlates with a broad belt of pelitic to psammopelitic gneisses (unit Wpsn) which contains narrow lenses of meta-arkosic gneiss (unit Wrn) and calc-silicate gneiss, marble and amphibolite (unit Wcn) as well as several minor intrusions of Hudsonian granitic pegmatite (unit Wpeg), granite and alaskite (unit Wg). In a group of mineral occurrences in the southwest of the zone associated with a lens of unit Wrn meta-arkosic gneiss, Cu-Mo-As-Ag-Co mineralization is represented by disseminated chalcopyrite, bornite, molybdenite and pyrite, and minor arsenopyrite, graphite and pyrrhotite in white quartzites. Silver and cobalt are indicated by lithogeochemical analyses. Elsewhere in the zone, Cu-Pb-Zn mineralization is expressed by disseminated chalcopyrite and pyrite in mixed psammites, pelites and calc-silicate rocks, and by anomalous lithogeochemical analyses.

The Cu-Mo mineralization in zone A quartzites and meta-arkoses has been likened to the mineralization of the Zambian Copper Belt (Cu-Co-Mo mineralization in Precambrian quartzites, greywackes, conglomerates and argillites); the Permian Kupferschiefer of Germany (Cu-Pb-Zn mineralization in shales, conglomerates and eolian sandstones) (84) and indirectly to the cupriferous Precambrian sandstones of Udokan, Eastern Siberia (85). These are all considered to be syngenetic.

Zone B: Zentner - Barefoot Lakes

Zone B corresponds to the narrow sinuous belt of pelitic and psammopelitic gneisses (unit Wpsn) which flanks the Johnson River Granite. Zn-Pb-Cu-Ag mineralization is present as sphalerite, galena, pyrite, pyrrhotite, minor chalcocite and accessory bornite, chalcopyrite and graphite, finely disseminated in greenish, buff and white quartzite, and more rarely in calc-silicate rocks and meta-arkose.

Zone C: Courtenay - Cairns Lake Belt

The belt comprises amphibolites (unit Wv), meta-arkose (unit Wr), and Wollaston Group metasediments which include metaquartzites (unit Wq) and a mixed sequence (unit Ws) of interlayered and interfingered laminated slate, meta-argillite, metaquartzite, metachert, meta-arkose, calc-silicate rock, marble and banded iron formation. Pelitic and psammopelitic gneisses (unit Wpsn) are possible facies equivalents of unit Ws (66, 72, 89).

The Zn-Pb-Ag mineralization is most commonly found as sphalerite, galena, pyrite, pyrrhotite and minor arsenopyrite in disseminations, quartz veins and fractures in white or grey quartzites of units Wq, Ws and Wpsn, and also in quartz-feldspar-biotite gneiss and meta-argillite of unit Ws.

The richest mineralization so far discovered is present in unit Wq quartzites at Brakewell (George) Lake. Here drilling has outlined "5 million tons averaging 2.65% Zn and 0.53% Pb" (67). Scattered mineralized float of similar or better grade, up-ice from the George Lake deposit, indicates that comparable mineralization might be expected in units Ws and Wpsn.

METALLOGENIC NOTES

Karup-Møller and Brummer (57) discussed the genesis of the sulphides in the George Lake deposit and other similar mineralization nearby. They considered several genetic models involving deposition: (a) during sedimentation (syngenetic), (b) from connate waters moving through the sediment during its consolidation (syndiagenetic), (c) from volcanic exhalations during or shortly after sedimentation (synvolcanogenic), (d) from solutions related to magmatic intrusions (epigenetic), (e) as detrital particles. No evidence was found to support an epigenetic or detrital origin. A synvolcanogenic origin was not favoured because the only volcanics known in the area are amphibolites lower in the sequence than the mineralization (66, 89). A synsedimentary or syndiagenetic origin was considered the most likely because of the following features: (a) the finely disseminated and interstitial nature of the mineralization, (b) the confinement of mineralization to specific rock types which are in sharp contact with other largely barren beds of similar lithology, (c) the intermittent occurrence of mineralization along strike for distances of up to 50 km, (d) the presence of sphalerite inclusions in porphyroblastic garnet, which indicate that the mineralization is pre- or synmetamorphic, (e) the presence of Zn/Pb ratios which compare well with the crustal average and with ratios obtained from adjacent unmineralized beds. Later metamorphic segregations (mineralized fractures and quartz veins) contain a higher proportion of galena to sphalerite.

The George Lake mineralization has been compared to Zn-Pb deposits in Eocambrian-Silurian quartzitic sandstones at Laisvall, Sweden; the Triassic of Largentiere, France; the Cretaceous of Bou-Sellam, Morocco and Kroussou, Gabon; and the Carboniferous of Cape Breton Island, Nova Scotia (11). These are all considered to be synsedimentary or syndiagenetic in origin.

The belt also contains iron formation, up to 100 m thick in unit Ws, that has been traced for 20 km from Spence Lake to Cairns Lake. The iron formation comprises a lower banded garnetiferous pelite (60 to 70 percent garnet) and upper silicate and oxide facies. The silicate facies is composed of garnet, tremolite/actinolite, hornblende, quartz and calcite, and up to 5 percent magnetite. The overlying oxide facies consists of interlaminated black magnetite-rich (up to 15 percent magnetite) meta-argillite and grey to white cherty magnetite-poor bands (12, 66).

The iron formation, classified by Harper (58) as a type E metataconite, exhibits many of the features characteristic of Superior-type iron formations, namely association with shallow-water marine detrital and chemical sediments, cherty nature, alternation of iron-rich and iron-poor layers, fine lamination and considerable areal extent. Volcanic rocks, though not always directly associated with Superior-type iron formations, are nearly always present somewhere in the succession (54); at Spence Lake they are lower in the sequence. Deposition likely occurred under shallow-water conditions on or along a stable continental shelf or in a miogeosynclinal basin after an initial period of instability and volcanic activity. The iron and silica could have been derived from either volcanic hotsprings or from an adjacent lateritically or desert-weathered landmass (54), subsequent precipitation being either chemical or biological (15).

Zone D: Campbell River Synform

The Campbell River Synform contains phyllitic slates ('argillites'), biotite-sericite schists and minor psammites ('Campbell River Group', unit Psl) (72), and other rocks, including hornblende and hornblende-biotite schists and gneisses, amphibolites and meta-gabbro, whose relation to the 'Campbell River Group' is uncertain (70, 72). Zn-Fe-Cu mineralization in the argillite appears as disseminated sphalerite, pyrite, pyrrhotite and minor chalcopyrite; it is probably of similar syngenetic origin to zones A to C.

Other Occurrences

Two isolated occurrences of apparently sediment-hosted Cu-Fe-Zn-Ag mineralization, comprising irregularly disseminated pyrite and pyrrhotite with minor chalcopyrite and sphalerite, are hosted by rocks of the Rottenstone Migmatite Complex. At Wepusko Bay (Saskatchewan Mineral Deposits Index (SMDI) No. 536) the host rocks are pelitic and psammitic gneisses (unit Rng) which locally include metaquartzite. Significant gold and silver values and minor nickel values were obtained in drill core assays. The Paskwachi Bay occurrence (SMDI No. 568) is hosted by inclusions of pelitic and psammitic gneiss and amphibolite in unit Rgt tonalite, granodiorite and trondhjemite. Accessory galena, graphite and garnet are present and minor silver and gold values were obtained in drill core assays.

A single occurrence of Ni-Fe-Cu-Ag mineralization has been recorded in the La Ronge Domain (the Kinoosao Prospect, SMDI No. 535). It is hosted by pyroxene-garnet-magnetite rock, amphibolite and quartz-feldspar gneiss xenoliths in unit Lgd granodiorite and quartz monzonite near the margin of the Jackpine Bay Pluton. Grab sample assays yielded minor silver values. No other information on the mineral phases present or the style of mineralization is available.

2) Mineralization in Basic and Ultrabasic Igneous Rocks

Cu-Fe-Ni mineralization associated with basic and ultrabasic igneous rocks is confined to the Peter Lake Domain. Chalcopyrite, pyrite and nickeliferous pyrrhotite with accessory niccolite and bornite occur as disseminations, aggregates and fracture fillings (19, 70) mainly in metagabbros, some of which are layered. Less commonly these minerals are found in metapyroxenite (18), diorite and hornblende gneiss (89). The layered McLean Bay Gabbro (SMDI No. 1834) has been compared to Precambrian layered gabbros in Wyoming that bear Co-Pt-Pd-Au mineralization in addition to copper and nickel (83). The potential of the McLean Bay Gabbro and other gabbros in the Peter Lake Domain as hosts for Pt-Pd-Au has not been fully investigated.

3) Molybdenite Mineralization

Molybdenite showings in the Peter Lake Domain have been found in granite pegmatite stringers, aplite sheets and quartz veins and 'blebs' related to Hudsonian felsic and megacrystic granitoids (units Pg and Pgp) (23). The molybdenite, which is described as "constituting about 5 percent of the rock volume ... only over a few inches" (92), is present as scattered flakes. Investigations subsequent to the original discovery (23) have failed to find any extensive mineralization; accordingly the molybdenite may represent nothing more than the accessory amounts commonly found in late-stage granitic differentiates.

4) Uranium Mineralization

Uranium mineralization is present in acid plutonic rocks, in the metasediments which they invade and in granitoid neosomes in the metasediments. The uranium (and in places thorium) minerals are seldom identified, their presence being indicated by radiometric anomalies, chemical analyses and less commonly secondary uranium mineral stains.

Three groups of host rock occurrences have been recognized:

(a) Felsic Granitoids

Unidentified uranium minerals are hosted by felsic granitoids (unit Pg) of the Peter Lake Domain. These granitoids comprise granite pegmatite and less commonly granite gneiss and granite. Beryl has been recognized in one granite pegmatite (SMDI No. 543). There is no association with uranium minerals.

(b) Middle Lake Granite

High radioactivity and unidentified secondary uranium minerals are present in the Middle Lake Granite (unit Pgpx) (99), its associated aplites and pegmatites and migmatized metasediments at its margin.

(c) Aphebian Metasediments

Anomalous radioactivity, uranium and thorium analyses, unidentified radioactive opaque minerals and secondary uranium minerals indicate uranium concentrations in the granitic neosome of migmatized Aphebian metasediments and in cross-cutting fractures in the Geikie River (A) and the Zentner - Carefoot Lakes (B) zones. The mineralization is locally accompanied by fluorite, both in the host and the adjacent rocks (SMDI Nos. 1841, 1702) (71).

In a general study of pegmatites in other parts of the Wollaston Domain, Thomas (96) concluded that granitic pegmatites in Aphebian metasediments were the products of *in situ* anatexis during upper amphibolite facies metamorphism. Their uranium content is attributed to concentration in mobile phases of pre-metamorphic syngenetic accumulations in the sediment. It is suggested these accumulations were themselves derived from uranium mineralization, either concentrated or diffuse, in the Archean basement. Uranium occurrences of groups (a) and (b) may either be primary or formed in a similar way to those of group (c).

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MAPS NOT

FILMED

CARTES

OMISES

POOR

QUALITY

ORIGINAL